Customer No.: 31561
Application No.: 10/708,372
Docket No.: 12680-US-PA

REMARKS

Present Status of the Application

Claims 12-26 remain pending of which claim 12 has been amended and claims 20-26 have been newly added to more explicitly describe the claimed invention. The amendment to claim 12, and new claim 20, are fully supported by paragraphs **[0013]** and **[0035]**, and paragraph **[0026]**, respectively. Therefore, it is believed that no new matter adds by way of amendment to claim 12.

In the outstanding Office Action, the Examiner rejected Claims 12-18 under 35 U.S.C. 102(b) as being anticipated by Poon et al. (US-5,436,488, hereinafter Poon); and rejected Claims 12-14 and 16-19 under 35 U.S.C. 102(b) as being anticipated by Godejahn Jr. et al. (US-4,587,711, hereinafter Godejahn).

For at least the following reasons, Applicant respectfully submits that claims 12-26 are in proper condition for allowance. Reconsideration is respectfully requested.

Discussion of the claim rejection under 35 USC 102

1. The Office Action rejected Claims 12-18 under 35 U.S.C. 102(b) as being anticipated by Poon et al. (US-5,436,488, hereinafter Poon).

Applicants respectfully disagree and would like to point out that rejection under 35 U.S.C. 102 requires that each and every elements of the claim(s) must be disclosed exactly by a single prior art reference.

Applicants respectfully submit that Poon cannot anticipate the proposed amended independent claim 12 because Poon substantially fails to teach or disclose each and every features of the claimed invention as claimed in the amended proposed independent claim 12. More specifically, Poon substantially fails to teach or disclose a shallow trench isolation (STI) comprising at least [a liner layer, formed over the substrate covering the insulating layer, wherein the liner layer is adopted for protecting the shallow trench isolation from external stress or thermal effect] as required by the proposed independent claim 12. The advantage of the features recited above is that at least dislocation/defects of the STI due to the external stress or thermal effects can be effectively reduced.

Instead, Poon substantially discloses, at col. 1, lines 24-43, problems related to transistors formed on the STI and a method of solving these problems. More specifically, Poon substantially teaches the transistor formed on the STI often suffers from premature gate oxide breakdown due to poor reliability of the gate oxide. According to Poon, one reason for premature breakdown of gate oxide is that the growth rate of the gate oxide grown near the trench corner is slower compared to those grown in other areas and has lower breakdown voltage as compared to those grown in other areas. In order to remedy this problem, Poon proposes forming a dielectric layer to completely cover the top and corners of the STI with comparatively thicker dielectric layer formed near the corners. Therefore, it is clear that Poon substantially recognizes the poor reliability of the transistors formed on the STI due to premature breakdown of the gate oxide due to formation of thinner gate oxide layer near the corners of the STI

and proposes a method of forming thicker gate oxide layer near the corners of the STI in order to resolve this problem. In other words, Poon substantially fails to recognize the dislocation of STI due to external stress or thermal stress, instead Poon substantially recognizes the poor reliability of the transistors formed on the STI due to formation of thinner gate oxide layer near the corners of the STI causing premature breakdown of the gate oxide and proposes a method of forming thicker gate oxide layer near the corners of the STI in order to resolve this problem. Thus, Poon fails to teach or disclose a liner layer for protecting the STI from external stress or thermal stress during the subsequent fabrication process as required by the proposed amended independent claim 12, and therefore Poon cannot possibly anticipate the proposed amended independent claim 12 of the claimed invention in this regard.

Applicants respectfully submit that the present inventors discovered and recognized the source of the problems as to what causes the dislocations/defects of the STI, and then set out to find a remedy to such problems. According to the present inventors, when the STI are left unprotected, its exposure to external stress or thermal stress could cause the dislocation/defects in the STI. Accordingly, the present inventors propose forming a liner layer to cover the STI, and thereby effectively protect the STI from external stress or thermal stress and reduce the problems of dislocation in the STI. Accordingly, Applicants would like to point out that the inquiry is not whether each element existed in the prior art, but whether the prior art teach (or made obvious) the invention as a whole for which patentability is claimed. A patentable invention may lie in the discovery of the source of a problem even though the remedy may be obvious

once the source of the problem is identified, and the question here is whether the prior art discovered/recognized the cause of the dislocation of the STI, which the present inventors intends to solve.

In other words, Poon substantially fails to teach or disclose a STI comprising at least [a liner layer, formed over the substrate covering the insulating layer, wherein the liner layer is adopted for protecting the STI from external stress and thermal effect] as required by the amended proposed independent claim 12, instead Poon substantially recognizes the poor reliability of the transistors formed on the STI due to formation of thinner gate oxide layer near the corners of the STI causing premature breakdown of the gate oxide and proposes a method of forming thicker gate oxide layer near the corners of the STI in order to resolve this problem. Accordingly, Applicants respectfully submit that Poon cannot possibly anticipate the proposed independent claim 12 in this regard.

Thus, Poon fails to teach, disclose or hint each and every features of the proposed independent claim 12, and therefore Poon cannot possibly anticipate the proposed independent claim 12 in this regard.

Furthermore, the newly added proposed claim 20, among other things, recites "wherein the liner layer comprises a CVD silicon nitride layer. Whereas, the second dielectric layer 44, the Examiner deems as equivalent to the liner layer of the claimed invention, is in fact comprised of silicon oxide layer (please see col. 3, lines 63-64) or silicon oxynitride layer formed by thermally nitriding a layer of CVD silicon dioxide layer (please see col. 3, line 68 to col. 4, line 6). Accordingly, Applicants respectfully submit that because the material of the second dielectric layer 44 of Poon is different

compared to that of the liner layer of the claimed invention, therefore Poon cannot possibly anticipate the new proposed claim 20 in this regard.

Claims 13-18 and 21-26, which directly or indirectly depend from independent claims 12 and 20 respectively, are also patentable over Poon at least because of their dependency from an allowable base claim.

For at least the foregoing reasons, Applicants respectfully submit that claims 12-18 and 20-26 are in proper condition for allowance. Reconsideration and withdrawal of above rejections is respectfully requested.

2. The Office Action rejected Claims 12-14 and 16-19 under 35 U.S.C. 102(b) as being anticipated by Godejahn, Jr. et al. (US-4,587,711, hereinafter Godejahn).

Applicants respectfully disagree and would like to point out that the present invention as claimed in claim 12 and newly added claim 20 are directed to a structure of a Shallow Trench Isolation (STI), while Godejahn substantially teach or disclose a conventional field oxide (FOX) 50 formed via thermal oxidation process (please see col. 7, lines 65-63), and therefore, Applicants respectfully submit that Godejahn cannot possibly anticipate the proposed independent claims 12 and 20.

Claims 13-14 and 16-19, and claims 21-26, which directly or indirectly depend from independent claims 12 and 20, are also patentable over Godejahn at least because of their dependency from an allowable base claim.

For at least the foregoing reasons, Applicant respectfully submits that claims 12-14 and 16-26 are in proper condition for allowance. Reconsideration and withdrawal of above rejections is respectfully requested.

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CONCLUSION

For at least the foregoing reasons, it is believed that all pending claims 12-26 are in proper condition for allowance. If the Examiner believes that a conference would be of value in expediting the prosecution of this application, he is cordially invited to telephone the undersigned counsel to arrange for such a conference.

Respectfully submitted,

Date : February 24, 2005

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